School Shop

vol. V no. 9

May, 1946

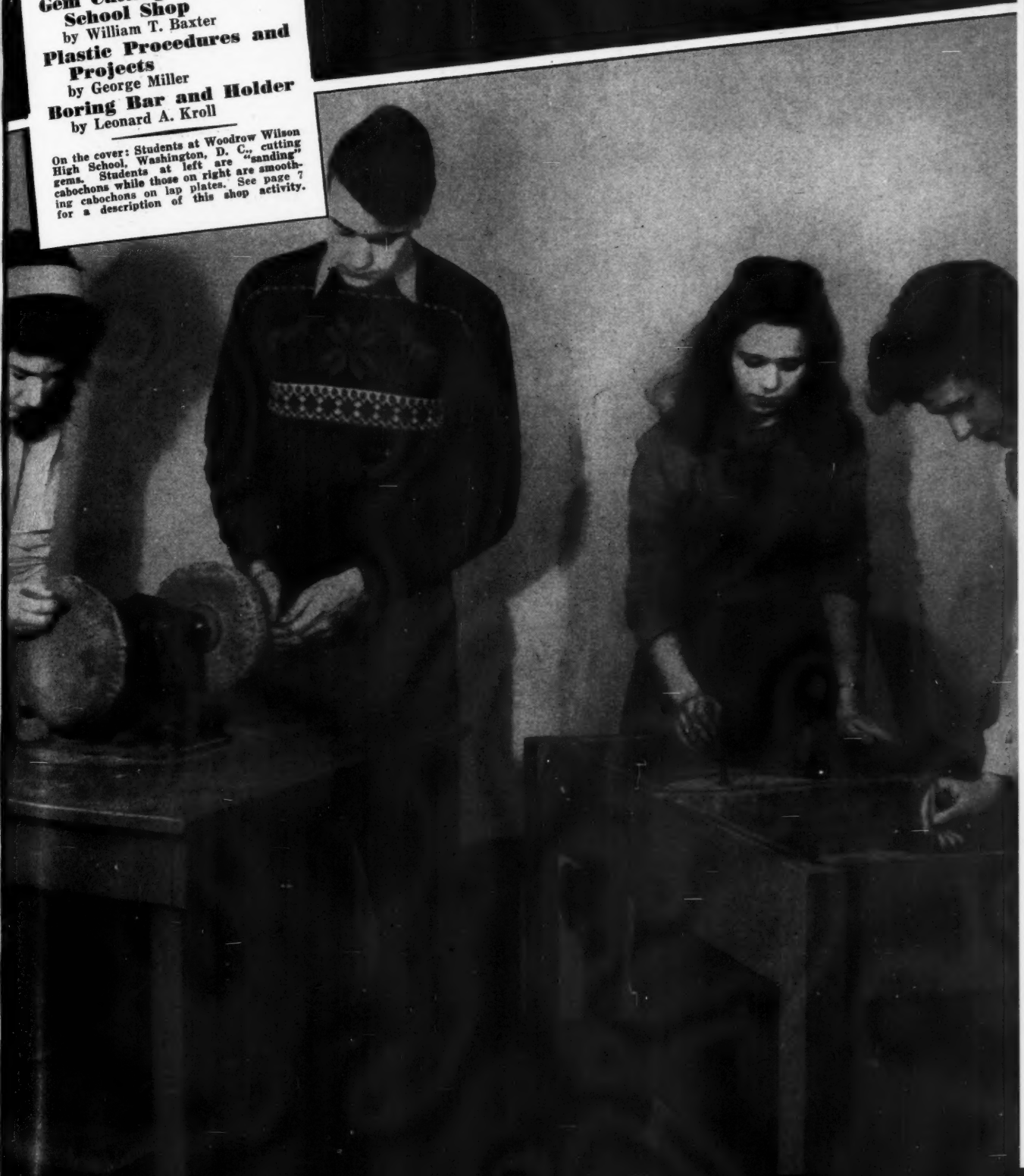
Junior-High-School Industrial Arts—A Discussion
by Stanley J. Pawelek

Gem Cutting in the School Shop
by William T. Baxter

Plastic Procedures and Projects
by George Miller

Boring Bar and Holder
by Leonard A. Kroll

On the cover: Students at Woodrow Wilson High School, Washington, D. C., cutting gems. Students at left are "sanding" cabochons while those on right are smoothing cabochons on lap plates. See page 7 for a description of this shop activity.



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School Shop

FOR INDUSTRIAL EDUCATION TEACHERS

May, 1946
Vol. V, No. 9

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School Shop is published monthly, September through June, at Ann Arbor, Michigan. Manuscripts are paid for at regular space rates and should be addressed to the Editor, School Shop, 330 South State Street, Ann Arbor, Michigan. Subscription rates to libraries and institutions, $2.00 a year; foreign and Canadian, $3.00 a year. 25 cents a copy. Printed in the U.S.A.

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Advertising Representatives: Mid-West—Macintyre-Simpson & Woods, 75 East Wacker Drive, Chicago 1, Central 1175 and 1900 Euclid Avenue, Cleveland 15, Ohio, Cherry 1501. Eastern—Macintyre, Simpson & Woods, 101 Park Avenue, New York 17, Lexington 2-8998.

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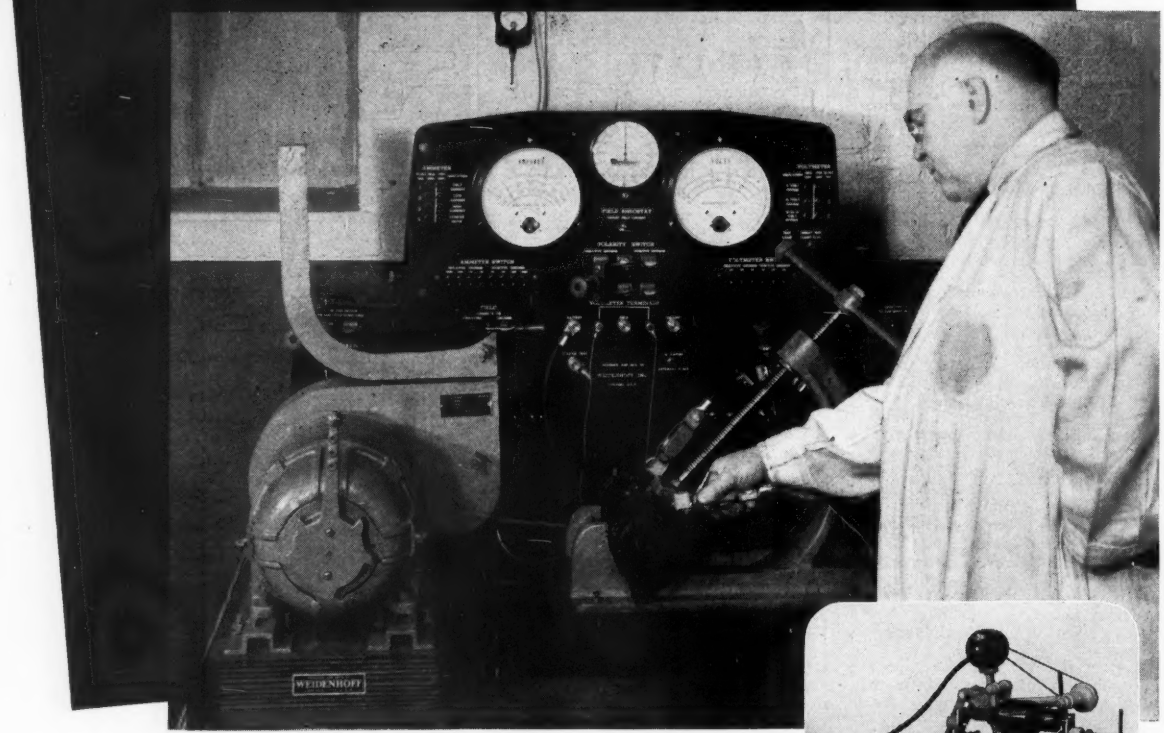

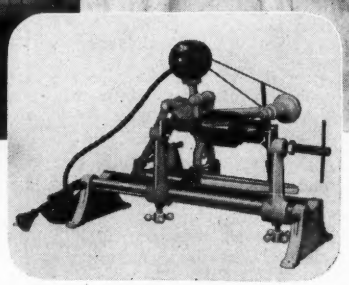

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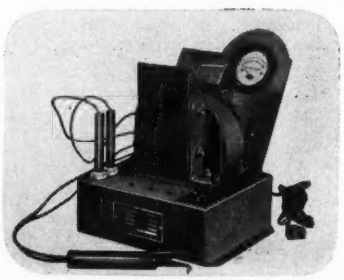

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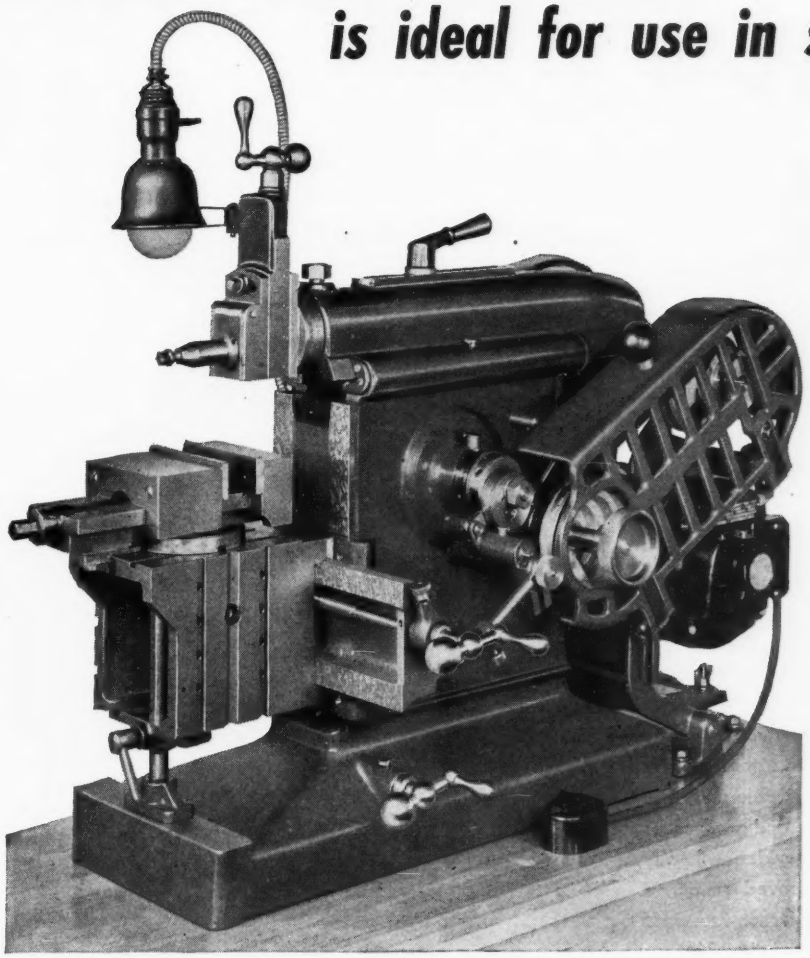

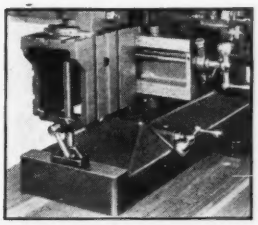

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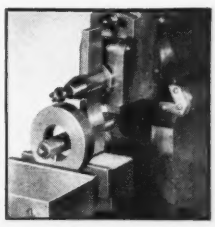

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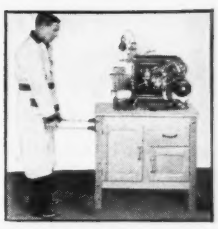

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Junior-High-School Industrial Arts

A Discussion of Issues

BY *Stanley J. Pawelek*

That education is dynamic, not static, is a truism. Yet teachers all too seldom act on their knowledge. The author of this article, who is Supervisor of Industrial Education, Baltimore, Md., Public Schools, raises some issues concerning objectives, methods, and course offerings which should stimulate selfappraisal among teachers.

Objectives

ONE of the most urgent needs of junior-high-school industrial arts in this postwar era is a clarification, crystallization, and a general acceptance of the objectives which undergird this program in the schools throughout the nation. After more than a generation of experience, we are in a position to take stock of ourselves, to cast aside that which is bad and to retain the good. It may be that we have grown too fast, or that we have been so busy with details that we have not kept our thinking about objectives unified. Or it may be that we were too enthusiastic about it all and felt that it had so much good in it that it did not matter whether or not we agreed on the direction in which we were going.

Whatever the reasons may be, the facts are that we have arrived at a stage where we must consolidate our gains and go forward united, or we may lose much of what we have gained over the years. Our thinking is confused. We cannot agree among ourselves even on some of the objectives which assisted the introduction of industrial arts into our junior high schools. For example, is the *exploratory aim* still as potent as it was 25 or 30 years ago? Many of us are quite ready to say "no"—others insist that it is. Some years ago, the emphasis on the acquisition of skills was practically nil. Today we hear the word mentioned rather frequently, and some of our leaders have expressed themselves very strongly in favor of our teaching skills rather than making interesting but poorly constructed projects.

These differences of opinion may be healthful signs of our growing up, but they do not help us to gain our rightful place in the educational scheme of things. Our academic colleagues often ridicule us for it and the patrons of our schools understand us only vaguely. We experience difficulties in justifying our existence because each of us attempts to do so on the basis of different objectives. Until we can arrive at a set of aims to which we can point as *the* objectives of junior-high-school industrial arts, we will not merit the recognition and respect that our area deserves. If we are to be thought of as a phase of *general education*, we must strive to set up our objectives in the same uniform manner as do teachers of English, history, mathematics, science, and languages. Our offerings are rather uniform from school to school, community to community, and state to state. It does not seem unreasonable to propose uniform objectives in the same manner. Is there any reason why junior-high-school industrial-arts objectives for New York should be any different from those in California?

About two years ago an Industrial Arts Planning Committee was appointed by the American Vocational Association for the purpose of reevaluating and redefining our entire industrial-arts program. One of the subcommittees of this body is engaged in setting up objectives for the various levels so that it may arrive at a set satisfactory for each. When this assignment is completed, it is our professional duty and responsibility to accept the objectives for our own area and to see that they are properly understood and achieved. Unless we do this, we cannot hope to be recognized as an integral and an indispensable part of the junior-high-school program.

Methods of Teaching

Because our objectives have not been clearly defined and because our teachers have not generally received the kind of education mentioned above, our methods of teaching leave much to be desired. The so-called "project method" has, without doubt, been overdone in our shops. And in instances where teachers are filled with a false spirit of "progressive education" the results are practically chaotic. Any pupil constructing, repairing, or designing articles which are prompted by whims and pseudo-interests of the moment is simply not following a good learning method.

Some teachers' courses of study are nothing more than lists of articles to be made. Others insist that in a shop class no course of study is necessary, while a small minority have available excellent courses of study, designed and arranged to follow sound teaching principles and laws of learning. The manipulative side of shopwork and drawing is stressed by many teachers almost to the complete exclusion of the informational or related. The reverse is very often observed in other situations. Prescription characterizes the work of some teachers while election, free or limited, is employed exclusively by others. Skill in the use of tools, in many instances, is relegated to a place of secondary importance while receiving a major emphasis in many others. Notebooks, themes, discussions, student reports, home assignments, textbooks, tests, motion pictures, film slides, and visual aids of many types and descriptions are used in some classes, while a total absence of these devices is noticeable in others.

This discussion may go on indefinitely. The general conclusion, however, is that there is a complete lack of uniformity as to teaching methods in junior-high-school industrial-arts classes throughout the nation. While standardization is not always desirable, a uniformity of agreement among us regarding certain procedures would be helpful not only from the point of view of better results, but also in the added respect of educators and laymen for our area of teaching. The following suggestions are given with the hope that they will assist in clarifying and unifying our collective thinking:

1. Keep standards high; whatever is done should be done well. "Sloppy" work, incorrect use of tools, use of incorrect tools, improper finishes, etc., have no place in the shop.

2. Prescribe all jobs, projects, and other assignments in the beginning of every course. This should lead to a limited choice followed by guided choice and free choice when fundamentals are mastered.

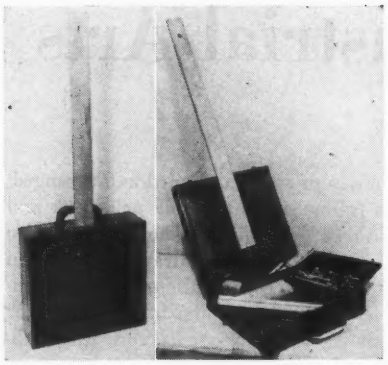
3. Arrange instructional units in the order of difficulty. Proceed from the known to the unknown slowly.

4. Be sure that the operations involved in the making of a project are well learned before the project is made. Your aim is the teaching of fundamental operations; the student's aim is to make something. Insist on practice of the operation on scrap stock before actual construction begins.

(Continued on page 14)

Drawing Equipment Case

BY *Albert Siegel*



This handy little drawing equipment case will be welcomed by students and gives them an opportunity to experience a number of operations and to learn several skills. The author teaches industrial arts at the Senior High School, Cliffside Park, N. J.

TESTED INSTRUCTIONAL PROJECT

THE drafting student will find this carry-all for his drawing equipment of considerable utility, especially in schools that do not supply instruments and materials and where the student must bring his own working paraphernalia to class. It also serves to keep everything in neat and compact order under one cover where it is handy at all times.

It has a built-in box for pencils, erasers, masking tape, sandpaper block, and other small items. The inside is 13" across so that it is large enough to allow for the scale, a cardboard tube for drawing paper, a set of drawing instruments, T-square, etc. In the cover of the case is a triangular-shaped block for holding the triangles and a peg for the French curves and protractor. The T-square head fits into the case and an opening in the box above the handle allows the blade to extend through.

In the construction of this project the student will have a variety of experiences such as cutting and squaring stock to size, making and fitting joints, gluing, sanding and finishing, fitting hardware, using nails and screws, and manipulating a large selection of tools.

The project will further the boy's interest in the care and maintenance of his equipment, gives him an appreciation of his own efforts, an opportunity to learn advanced operations and skills, and helps to develop an interest in craftsmanship and the industrial processes. If properly made, it should develop a feeling of pride in possession and appreciation of ownership.

The writer found the best procedure was to construct a solid box first, then ascertain the dividing space between the cover and the bottom and cut along that line on the circular saw. This will guarantee a proper fit. Any hardwood can be used. The case pictured was made from mahogany.

Procedure:

Cut to size and square all pieces called for in the bill of materials.

Sand smooth all pieces *now*. This will greatly simplify the final assembly.

Cut a rabbet ¼"x¼" on both working edges of ends and sides. This is to permit setting in the top and bottom panels.

Next cut a ¼" groove, ¼" in on both ends of the two ½"x4"x12" pieces.

Cut a dado ¼"x¼" on both edges of the ½"x4"x14" pieces.

Make a trial assembly to check for fit.

Apply glue to the joints and set in clamps. Apply pressure evenly, holding try square in corners to be sure ends are square.

While the frame is setting, cut a rabbet ¼"x¼" all around the face of the top and bottom panels.

Glue and set both pieces in at the same time. Be sure to lay strips of scrap wood along the edges of the top and bottom before clamping to insure even pressure all along the gluing surfaces and to keep from marring edges.

Set the fence on the circular saw for the proper depth of the top, 1½", and the blade a fraction higher than the thickness of the stock.

Cut out a block ½" thick, the shape of the cut-out in a triangle, rabbet all around (Fig. "A"), and set (with the rabbetted side to the back) into the top with a ¾" No. 6 R.H.B. screw.

Form turn knob for French curves and protractor ¼"x½"x1".

Drill a hole through the center with a ⅛" gimlet bit and attach with a ¾" No. 6 R.H.B. screw (Fig. "B").

The ½"x1¾"x13" piece of stock is the front wall of the box section.

Rabbet a groove ¼" wide, ¼" down from the tops of the box end pieces, ½"x2"x2¼", as a slide for the cover.

Glue and brad the front wall piece to the ends and set into case. The ends should be glued to hold it in the case and a few ¾" wire brads set in to secure it.

A piece of wood ¼"x2"x12½" is used as the box cover. Sand well to allow easy sliding and cut out a thumb-shaped indentation for easy handling.

Set in a pair of 1½" hinges to insure the top fitting flush when closed.

At the opposite side, cut an opening ¼"x2¼" for the blade of the T-square. A handle for the case may be purchased at a luggage shop or hardware store. The handle shown was cut from ⅞" stock, rounded on the top to fit the palm. The grain in the handle must run lengthwise for strength.

Attach handle (if using wooden one) by drilling holes through box (below cut out), countersinking from inside, and using 1" No. 8 F.H.B. screws.

Sand, using ½ and finishing with a 00 sandpaper.

Brush all arrises with sandpaper to remove sharp edges and corners.

If using hardwood, size after staining, allow to dry, and varnish.

When case is finished, fasten on a pair of box catches, one on each side of the handle.

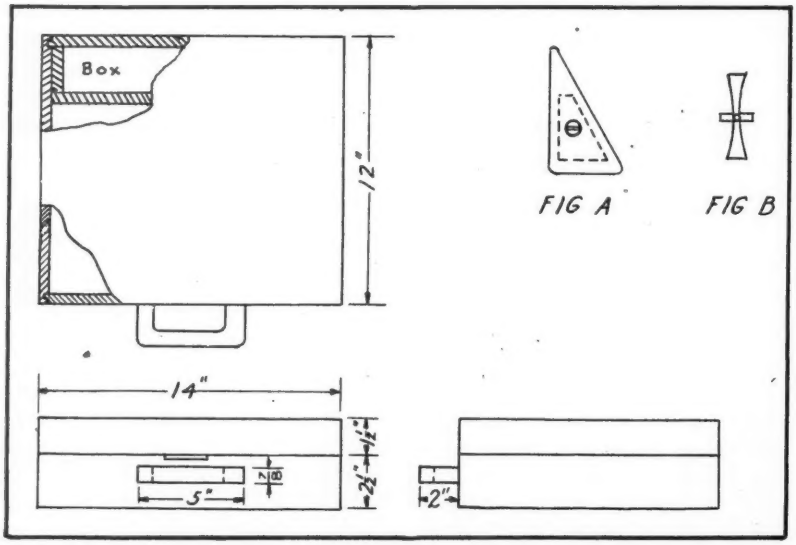


FIG A

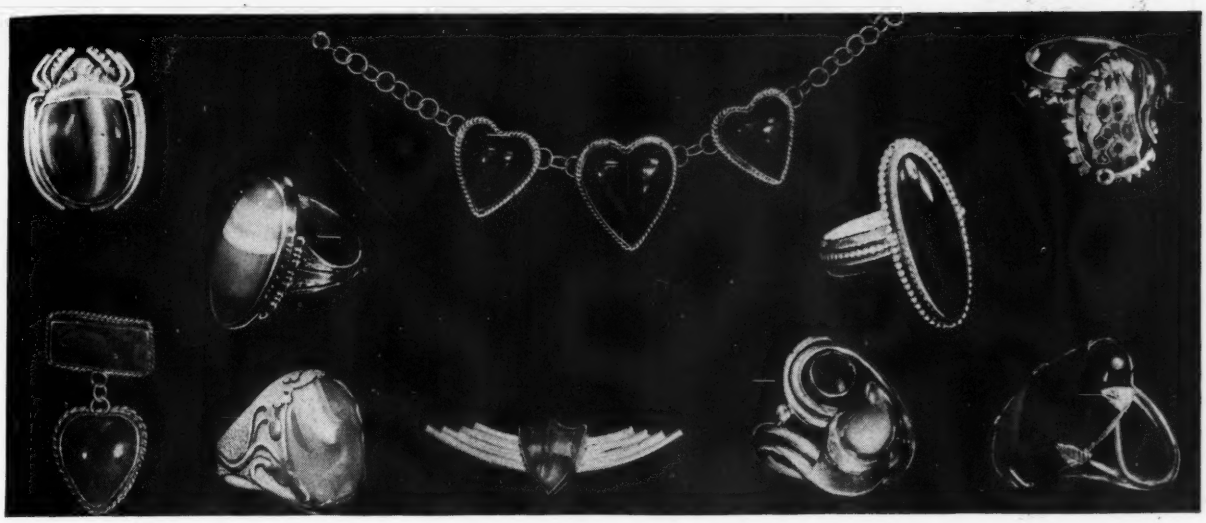
FIG B

BILL OF MATERIALS:

Top & Base	2 pcs.	½ x 14	x 12
Sides	2 pcs.	½ x 3½	x 14
Ends	2 pcs.	½ x 3½	x 11½
Inner Box Front	1 pc.	½ x 1¾	x 13
Box Cover	1 pc.	¼ x 2	x 12½
Box Sides	2 pcs.	½ x 2	x 2¼

Watch for the June Issue!

SCHOOL SHOP will bring its readers an unusually valuable pair of features in the June number. In addition to the regular directories of suppliers and officials which have been such useful references for readers in past June issues, next month SCHOOL SHOP will carry in addition a Shop Planning Portfolio which will be of real help to those planning expansion of their shop facilities. Look for this special number which you will want to keep for reference throughout the year.



Examples of rings, pins, brooches, and bracelets made by students of the author and incorporating gems cut in the school shop.

Gem Cutting in the School Shop

BY *William T. Baxter*

Gem cutting is a fascinating shop subject and has many educational values, not the least of which is its hobby value. William T. Baxter is a teacher in the Woodrow Wilson High School, Washington, D. C., and the author of "Jewelry, Gem Cutting, and Metalcraft."

GEM cutting is one of the newer types of crafts that are being taught in a number of high schools. The author became interested in the subject 11 years ago when information was very hard to obtain. Although it started as a hobby with several students helping, it was soon introduced to students in his jewelry-making classes and before long had grown into part of the regular class work.

Today students in the author's classes grind and polish all the cabochons they use. It is fascinating and challenging. Students take pride in selecting pieces of rough material — agates, petrified wood, jaspers, crocidolite, etc.—studying the material, outlining the stone, and grinding and polishing it into a beautiful gem stone which they use in making rings, bracelets, brooches, pendants, and other pieces of hand-made jewelry. Students often sell a finished pendant or other piece of jewelry to friends for enough to buy all the rough gem material they will use in a semester's work.

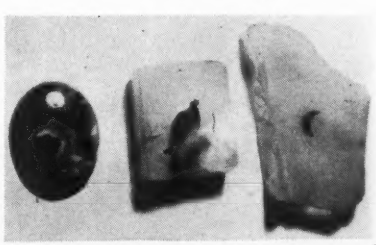
Interest in gem cutting in the craft field has grown by leaps and bounds during the past few years. It has been introduced to many men and women in the Armed Services, especially to those stationed in camps in the western states. It is today being taught in many convalescent hospitals.

Following is a description of gem cutting as developed in the author's school shop. Lapidary work is introduced in many schools with a minimum amount of home-made equipment, for gem stones can be ground and polished with simple equipment. Recently equipment has been offered on the market at a reasonable price which is excellent for school installations and for home hobby purposes.

Gem Stones

Gem stones are divided into two groups: cabochons, stones with rounded tops and flat bottoms or with rounded tops and rounded bottoms, and faceted stones, the stones with flat surfaces or facets.

Odd patterns are frequently found in stones or slabs and can be utilized in a finished piece. An outline of South America can be noticed in the pendant on the left while a dove or partridge appears in the middle slab and a crescent in the one on the right.



Cabochon cutting is by far the most popular with both amateur craftsmen and students. This is due to the fact that all work is "free hand" and students may stop or start any operation at any stage and also because rough material used for the cutting of cabochons is more plentiful and cheaper.

Cabochons may be ground and polished on a horizontal running lapidary unit, such as illustrated here, or on a single grinding-buffing arbor that has a step pulley affording a change of speeds. Many craftsmen, after becoming interested in the craft, install two or more lapidary units or arbors to keep from changing equipment. Once the work is introduced in a school shop, it is almost imperative that there be several machines, so that students may move from machine to machine as they progress with their work.

Faceted stones require a flat lap, running horizontally, and most craftsmen use a faceting index in order to cut facets at the proper angle. Many professional cutters, especially in the Orient, do not use a faceting index, but use a "jamb peg." This is a vertical wooden peg with holes drilled at various heights. The desired angle is obtained by placing the end of the "dop stick," to which the stone is cemented, in the proper hole to give the desired angle. Faceted material is not as plentiful as cabochon material. In many

Students making mountings in sterling silver for stones which they have ground and polished.

instances the mines producing this material are owned and controlled by syndicates.

Cabochon cutting is divided into four steps, none of which is hard to master. These steps are sawing, grinding, sanding, and polishing.

Sawing Stones

There are two methods of sawing the rough mass of gem material into slabs and blanks suitable for cabochon work: diamond sawing and grit sawing. Today, most craftsmen as well as professionals use the diamond saw, a metal (steel or phosphor-bronze) disc the periphery of which is charged with diamond grit. These diamond-charged discs are fast and smooth cutting and produce a slab that is uniform in thickness.

The author used one 12″ diamond-charged blade that cost less than ten dollars on a home-made (though precision-made) diamond-sawing outfit in his basement workshop for eight months, sawing mostly agate. This blade slabbed most of the material used by more than a hundred students in his high-school classes.

Diamond sawing is more exacting than mud sawing. To get best results, the arbor carrying the blade must have no end play and some means must be provided to hold rigidly the material being sectioned and feed it into the blade at a uniform rate. The most common method of feeding the material into the saw is to use gravity—a swinging arm or carriage holds the material, to which is fastened a rope running over a pulley with a weight tied to the end. Diamond saws must be kept well lubricated to keep the blade cool and the cut clean. A mixture of half kerosene and half lubricating oil is satisfactory and is used extensively.

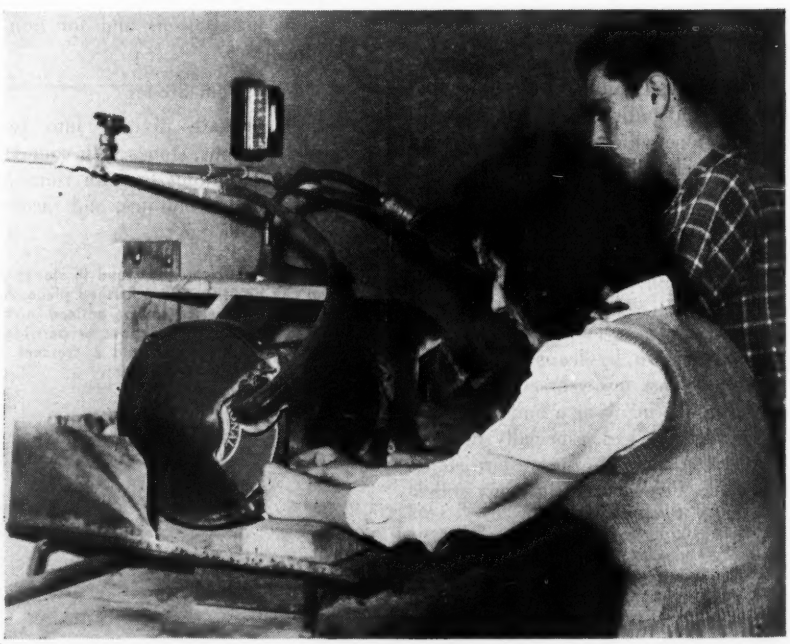
The mud saw is essentially a metal disc revolving in a soupy mixture of silicon carbide, clay flour, and water and depends on the silicon carbide adhering to the blade for the cutting. This method of sawing is still used by some cutters. Large specimens of petrified logs, meteorites, etc., are generally sawed with silicon-carbide grit. Band saws, using toothless blades and having a sliding carriage, are oftentimes used for this work, the grit being fed into the top of the cut.

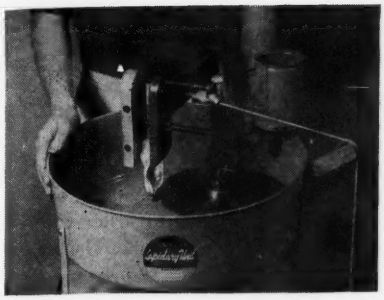
Grinding

Grinding, the second step, is usually done on vitrified silicon-carbide wheels, although it can be done on flat laps using silicon carbide for an abrasive. The wheel method is much faster.

Silicon carbide, an artificial abrasive that is harder than corundum (sapphire) yet not as hard as the diamond, is the hardest artificial abrasive that is made into a grinding wheel. Silicon-carbide grit is sharper and harder than aluminum oxide, another artificial abrasive. A medium bonded wheel is best for cutting cabochons. For the roughing-out process, a No. 90 or No. 100 grit wheel is generally used. The cabochon can be further ground and smoothed by using a No. 180 or No. 220 grit wheel. Hold the stone, in the fingers, against the periphery of the wheel and grind to shape. Keep a stream of water directed on the wheel surface to maintain a clean surface and to keep the cabochon cool so that it will not break. The usual procedure is to select a slab of rough material and draw the desired outline of the cabochon on the slab, using a pointed aluminum rod as a pencil. Study the piece of rough material before outlining the cabochon and make the most decorative use of the natural markings. Grind to outline and then to shape. Small pieces of gem material can be ground to shape without sawing. Grind

Grinding stones on vitrified silicon-carbide wheels. The wheel must be kept wet during the grinding of the stone to keep the wheel surface clean. The water also keeps the stone from getting too hot and cracking.





Piece of rough gem material being sectioned with a diamond-charged disc.

A piece of rough gem material being ground to shape on a silicon-carbide wheel.

A shaped cabochon being sanded on a revolving disc covered with silicon-carbide coated cloth.

Polishing the gem stone on a felt wheel.

Flat lapping a cabinet specimen, using silicon-carbide grit on a revolving flat iron lap.

Sanding a cabinet specimen on a drum sander covered with silicon-carbide cloth.

a flat surface and proceed as with a slab. The best grinding speed is from 5000 to 6000 surface feet per minute.

After grinding the cabochon to shape, cement it to a dop stick, a short length of dowel rod. Use lapidary cement or red sealing wax. Melt the wax in a tin can and immerse one end of the stick in the melted wax, repeating the process if necessary until enough wax clings to the end of the stick. Warm the stone and wax on the end of the stick and when the stone is warm enough to melt the wax, place the dop stick on the stone and mold the wax to shape. Keep fingers wet while molding the hot cement.

Sanding

Sanding, the third operation, can be done in a number of ways, the object being to remove the marks left in the grinding operation and to leave a surface as smooth as possible for the final operation, polishing. Most craftsmen in the United States use a fine-grit silicon-carbide cloth stretched over a sponge-rubber or felt-covered wooden disc. The silicon-carbide cloth is stretched over the disc, held in place with a clamp, and the stone is sanded as the disc revolves. The speed of the sanding disc should be from 800 to 1200 r.p.m. Care must be taken during the sanding operation to keep the stone from overheating and cracking as this is a dry operation. Another method devised by the author is to cover with sponge rubber a wooden disc that is mounted on a face plate that fits the

Cutting a faceted stone on the flat lap with the aid of a faceting index head.

arbor. The rubber is covered with canvas which is coated with thin cabinetmakers' (hot) glue and dusted with grit from a large salt shaker. The disc can be recharged by melting the grit and glue with hot water, drying, and recharging. Water glass can be used instead of hot glue, if desired. Another sanding method is to use a hard-wood disc and apply the grit mixed with water directly to the wooden surface. Silicon-carbide grits No. 220 and No. 320 are generally used in the sanding operation, although some cutters use No. 500 grit on a hard-wood disc for the final sanding which will give agates a very good shine or polish. When sanding, keep the stone in motion.

Polishing

The final polish is given the cabochon on a hard felt or leather buff, using one of the standard polishing agents. Tin oxide has long been considered one of the best polishing agents for most cabochons although levigated alumina has been in wide use the past few years due to the scarcity of tin oxide. Powdered rouge is also used in polishing. Cerium oxide, although more costly than tin oxide, is now being used extensively. Wash the cabochon and dop stick after the sanding operation to remove any adhering grit before starting the polishing operation. Mix the polishing agent with water and apply to the wheel with hand or brush. Avoid running the wheel too dry as this may crack the stone. Canvas stretched over a rubber- or felt-covered disc is used by many craftsmen for polishing and works very well. Some stones, such as jade, will not polish on felt wheels and must be polished on leather.

Many cabochons are cut into pendants. Instead of mounting in silver or gold, a peg is cemented into a drilled hole or a bail is attached by using a hollow tube as a rivet, the tube going through a hole drilled in the stone. As most cabochon material is harder than a steel drill, either diamond grit or silicon-carbide grit must be used for the drilling. Use a piece of brass tubing for the drill. Cement stone to a board and cement a narrow ring around the spot where the hole is to be drilled. Place tubing in the drill press, align tubing and stone, and raise and lower the tubing against the stone after having placed a mixture of grit and oil in the ring cemented on the stone. It will soon cut

(Continued on page 32)

Plastic Procedures and Projects

BY *George Miller*

This is a general description of procedures for the teacher interested in introducing plastics into his industrial-arts work. Also included are descriptions of two excellent projects. George Miller teaches at Western Michigan College of Education, Kalamazoo.

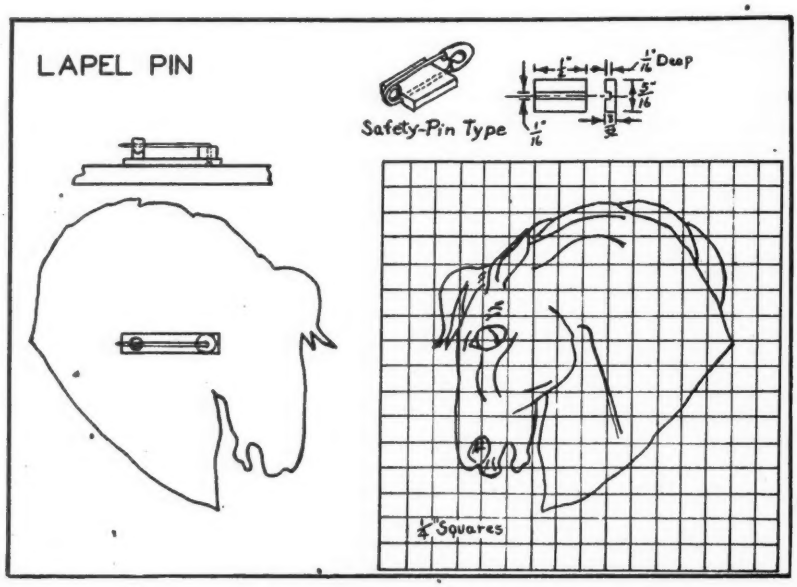
THE use of plastic (methyl methacrylate) in school shops will be very popular for many years to come because of its adaptability to a wide range of projects. It also is clean and only a small amount of equipment is necessary. It has an advantage over most wood and metals in that no finishing agents are required to complete a project except for polish. Plastic is not affected by moisture to any great extent and the tool outlay can be limited or extensive, depending on the hand work a person is willing to do.

The two plastics known by the trade names of Lucite, manufactured by DuPont, and Plexiglas, manufactured by Rohm and Haas, are the products which will be discussed in this article. Both have common characteristics and, without becoming too technical, may be said to work equally well under the same conditions.

Plastic can be bought from the manufacturer, or scrap may be obtained at a nominal price from a fabricator of these materials. Lucite and Plexiglas can be purchased in the following forms: sheets, rods, tubes, large blocks, and castings which can be made on special order. In most cases these materials come with each side covered with a masking paper. This paper should be left on until all machinery and polishing operations are completed in order to protect the polished surfaces from becoming scratched. It also allows layouts to be made on the paper, so that cutting may be done on the jigsaw or other machines without any further laying out.

Plastic can be sawed on regular woodcutting machines, if speeds are reduced. If high speeds are used, a lubricant must be applied as a coolant, and a high-speed saw used. The general practice is to use a saw with from 8 to 22 teeth per inch. The thicker the material, the coarser the teeth may be. These materials gum and freeze when too much friction from the tools develops heat. When this occurs, it can be remedied by either reducing the speed or applying a lubricant. Water is the best, although machine oil is also acceptable.

After plastic has been cut to shape, the edges which show should be filed and sanded to remove all saw marks. A good mill bastard file cuts fast and, by using a medium-grit abrasive paper after filing, a fairly smooth surface can be obtained for the polishing process. The next step is to sand with a small piece of wet or dry finishing paper (320 to 380), using water, oil, or wax as a lubricant for this operation. If a satin finish is desired, no further finishing is required.



In polishing by hand, use a soft piece of felt or chamois. Apply a polish to cloth and rub briskly. The amount of time you spend on this operation will determine the amount of luster you will have on your finished work. The following polishing agents have been used successfully by the Arts and Skills Corps of the American Red Cross in their hospital work: hair oil, machine oil, tooth paste, tooth powder and water, floor wax, lard, and other forms of wax polishes.

In cementing plastic, care should be taken to see that all edges are straight and as much bearing surface as possible is maintained. Tension should be eliminated. In most cases, parts may be held by hand during a cementing operation as the cement sets in two or three minutes. Small weights can be used to hold parts in place. There is no need for pressure so clamping is not necessary except on large work. For average school work, small spring clamps made from a piece of spring wire are all that is necessary. On overhanging parts, a longer drying time is required. Two to three hours should be allowed for the cement to set before doing any further work. Prepared cements work well, also chloroform, but the writer has had good results from a cement made of 7 parts ethylene dichloride and 1 part small plastic scrap. Dissolve and keep in a tight glass container. This makes a good, strong, clear cement. If it thickens, thin with ethylene dichloride. Add scrap if too thin. For small jobs, Duco cement made by DuPont is more economical as there is no waste.

In making joints, pour a line of cement on a clean white paper, following the contour of the part to be cemented. Then set the part in this ribbon of cement. This gives a good film of cement and will make a strong joint. On irregular pieces, a brush or slice of wood can be used to apply the cement.

These materials can be formed or bent into nearly any shape by heating to 225° to 250° F. There are several methods of heating. Here are a few: electric hot plate, flat iron, toaster, electric grill, and ovens where the heat can be controlled. Never heat over an open flame. Although these materials are slow burning, your work will be ruined if you are not very careful. One important advantage of plastic of this type is that you can reheat and rebend it as many times as necessary and it will not have any effect on the finished article. The only

precaution is "Don't overheat!" This will cause a cloudy effect which is undesirable in most work.

To bend or form plastic, heat material until it becomes soft enough to bend into desired shape and either bend and hold in position until cool or heat and place in a form or die. It is a good practice to wear soft cotton gloves when handling plastic. They will protect your fingers and also keep the surface of the material from becoming marred. Round shapes can be bent over any object that has the proper diameter. When irregular shapes are formed, however, or where sizes must be maintained, some form of holding device should be made. This can be of either wood or metal.

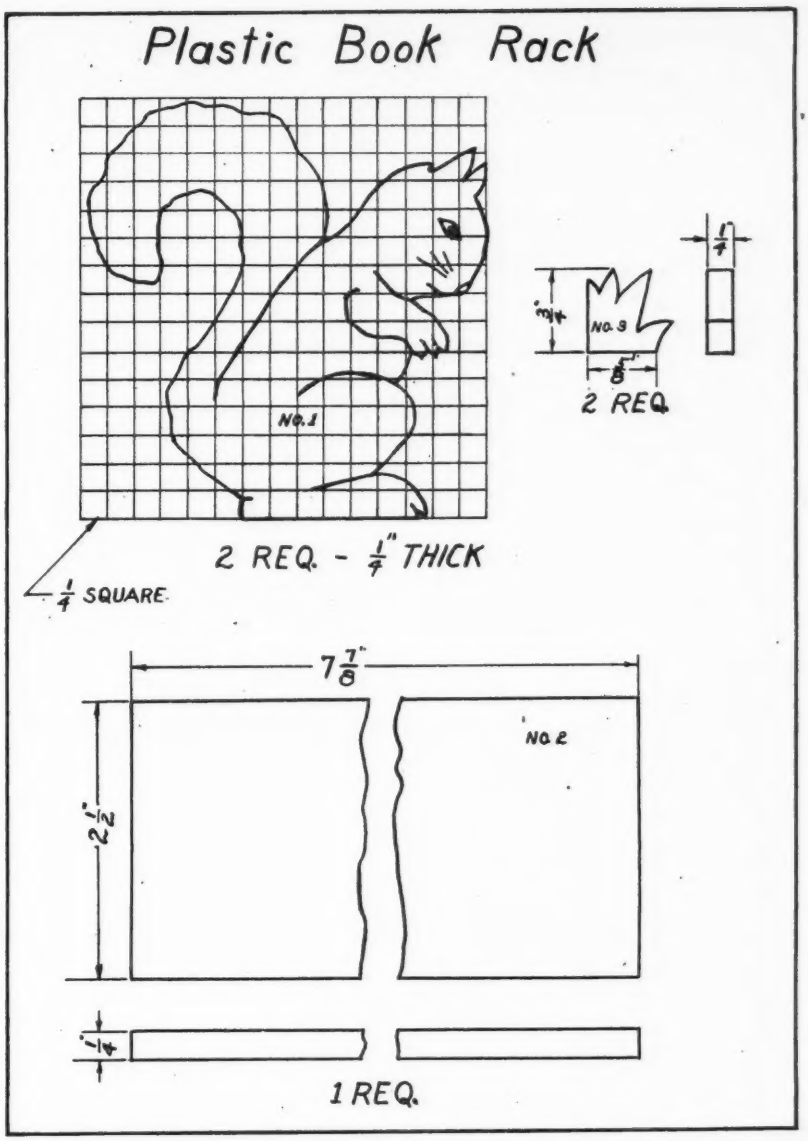
Where lines for decorations or facial outlines are required, they can be made by various methods. Some of them are: scribing with a sharp pointed tool, burning in with a hot point, grinding or carving with an electric pencil, and using a regular carving tool.

Any object can be embedded into the plastic by heating the material to 250°, then pressing the object into the heated section. If two pieces are heated to the high limit and then placed together, a clear joint is made without cement. This practice is used to put small coins in plastic hearts, etc., making a permanent setting for the coin.

You can paint on these plastics if you sand with 320 wet or dry finishing paper and use laquer or nail polish. Where lines are required, draw on with pencil first. When correct, ink in with India drawing ink. Then cover the line with lacquer. Some outstanding results can be obtained with a little practice.

Any regular standard projects can be copied in plastic, as long as the material thickness conforms to the requirements. Follow the usual procedure—lay out, saw, clean, polish, bend, and cement—and I believe you will find these materials holding student interest as well as your own. Many projects can be finished in one class period. This will have an upgrading effect on some students. Plastic is one form of teaching aid you should not overlook, as it fills a long felt need for something new. Students will develop some original ideas and you, as a teacher, will find enjoyment in helping develop these new materials which are becoming increasingly important in industry.

The plastic book rack project meets the requirements of nearly any type student. The product is new, the method of procedure the same as for wood, and it allows the student to make designs and originate ideas.



This book rack was designed for occupational therapy work and was found to be so popular it was made a permanent project for all students from junior high school through teacher training. Boys and girls both enjoy working with plastic. It gives experience in following simple rules and the enjoyment of finishing a beautiful article in a short time. Also, it can be worked with very few tools, all of which are found in the average school shop.

Material:

¼" scrap Lucite or Plexiglas.

Tools:

Pencil for layout or scriber if no masking paper is on plastic.

Jig saw or coping saw.

8" mill bastard file.

Medium and fine emery cloth.

Wet or dry finishing paper (320 or 380).

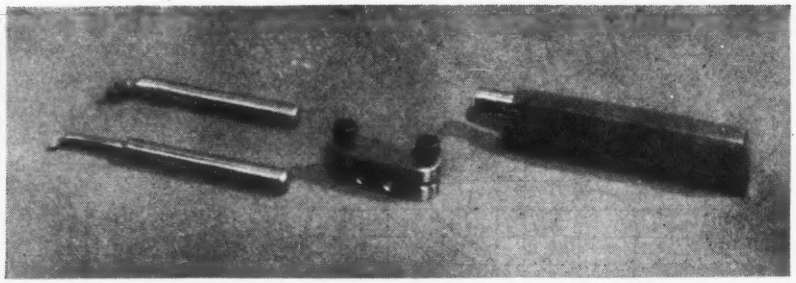
Wax polish.

Plastic cement (Duco) or mix your own (ethylene dichloride).

Procedure:

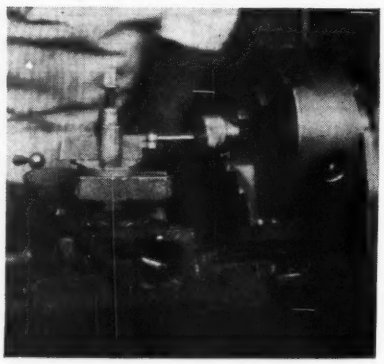
1. Select materials to fit layout.
2. Lay out No. 1 on masking paper (generally found on all new plastic scrap). If no masking paper is on plastic, scratch lay out in with a scriber.
3. Tape two ¼" pieces of plastic together with the layout up. Saw the two out together. This will give you two identical cutouts.
4. Lay out and cut one piece like No. 2. No layout is needed if cut on a circular saw.
5. From the scrap saved after sawing No. 1, lay out and saw two pieces like No. 3.
6. Sand and polish all edges.
7. Place sketch under plastic after

(Continued on page 12)



Boring Bar and Holder

BY *Leonard A. Kroll*



Here is a relatively simple machine-shop project which can be used to teach a number of operations and processes and yet requires a minimum amount of time to construct. Leonard A. Kroll is a machine-shop instructor in the Samuel Gompers Vocational High School, Bronx, New York City.

TESTED PROJECT

There are many types of lathe boring bars and holders. I have found the one described here to be the most adjustable and useful, especially on a bench lathe.

Its advantages are:

1. No shims are required to put the cutting edge of the boring bar on center.

2. The shank of the boring bar is always kept in a horizontal position which prevents it from rubbing at the top or bottom of the hole being bored.

3. Complete adjustments may be made very quickly.

4. The clamp may be moved to either side of the holder, thus giving it much greater freedom of movement so as to eliminate interferencc with moving parts such as chuck jaws, etc.

5. The boring bar shank remains straight and unmarred without any set screw nicks or dents.

6. Its construction is very simple and it may be made very quickly.

7. It is an ideal and useful tool for the student to make in the machine shop. Many and varied operations are employed in its construction: drilling, tapping, reaming, slotting, eccentric turning, forging, case hardening, hardening, tempering, etc. In addition, the amount of material used is small and the appeal to the student is great.

The construction of this boring bar and holder is as follows.

Holder:

1. Cut off a piece 3 9/16" long of cold rolled steel 3/8" x 3/4", of rectangular stock.

2. File, shape, or mill one end to a 55° angle.

3. On the other end, lay out the .312" diameter.

4. In a four-jaw independent chuck, true up this layout and turn eccentrically.

Clamp:

1. Cut off a piece 1¾" long of cold rolled steel ½" x ½" square stock.

2. Layout 5/16" and 10-32 holes, also ¼" radii.

3. Drill and ream 5/16" holes.

4. Drill No. 21 tap drill through both ends.

5. Redrill with No. 10 body drill halfway through.

6. File or mill ¼" radii.

7. Hacksaw or mill 1/16" slots.

8. Tap 10-32 holes.

9. Break all sharp corners and polish.

Boring Bar:

1. Cut off a piece of 5/16" drill rod 3" long.

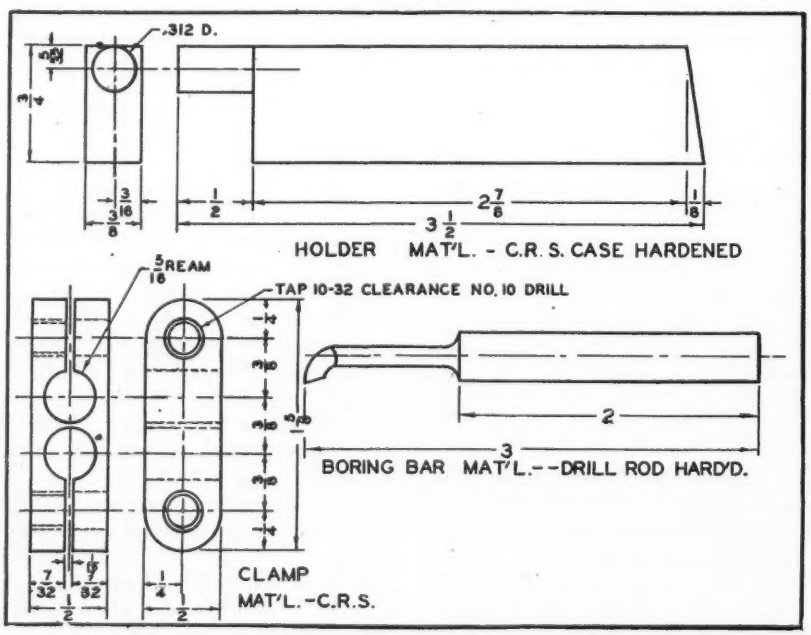
2. Face off both ends.

3. Turn one end to diameter and length required, depending on the size of the hole to be bored.

4. Forge end.

5. Harden and temper.

The dimensions given in this article may be proportionally increased to fit larger lathes.



Plastics . . . . *from page 11*

removing the tape. Piece and scribe in lines.

8. Remove paper from one side of piece No. 2 and cement on No. 1 pieces ¾" from each end and in the center of the base. Glue them on one at a time and hold in place with flat weights, either metal or wood.

9. Cement on No. 3 pieces so they add strength to No. 1.

10. Remove all masking paper.

Questions for the student:

Do you think the project would be improved if edges were beveled on the No. 2 piece?

How do you think it would look if some lines were scratched in the base to take away the plainness of it?

Have you a better idea for the supports, piece No. 3, that could be sawed from the scrap?

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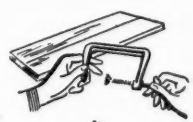

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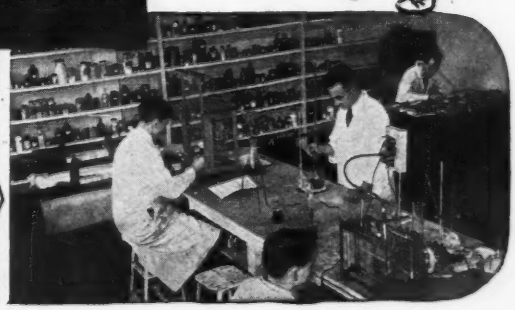


Issues . . . . *from page 5*

5. Avoid too much talking in conducting lessons and demonstrations. Let students do some thinking of their own. Do not tell answers until the student has tried first.

6. Do not send students to work without at least a brief lesson, observation, demonstration, or review.

7. Use instruction sheets sparingly and only in cases where verbal or group instruction is difficult or impossible.

8. Avoid "marking-time" activities such as calling roll, copying from a blackboard or book, a long clean-up period, etc. Things should move with dispatch and precision.

9. Home assignments, tests, reports, discussions, textbooks, visual aids, and devices should be employed in all classes. Roughly 75 percent to 80 percent of the students' time should be spent in actual manipulative work. The remainder can well be devoted to informational topics.

10. Discussions, lessons, and demonstrations should not exceed 20 or 25 minutes. Take students' attention span into consideration.

11. Keep progress charts conspicuously posted if at all possible. This device is not only a "stimulator" to students, but also permits the teacher to show or see at a glance where each student stands in relation to the class.

12. If each student understands what is required in the class and sufficient class teaching has been done, the teacher will be relieved of the problem of the students "ganging up" on him and keeping him so busy during the work period that he has no time for overall supervision and occasional individual assistance to less able students.

13. Follow some generally accepted pattern for teaching a lesson or giving a demonstration. The simplest one is: (*a*) preparation, (*b*) presentation, (*c*) application, and (*d*) evaluation.

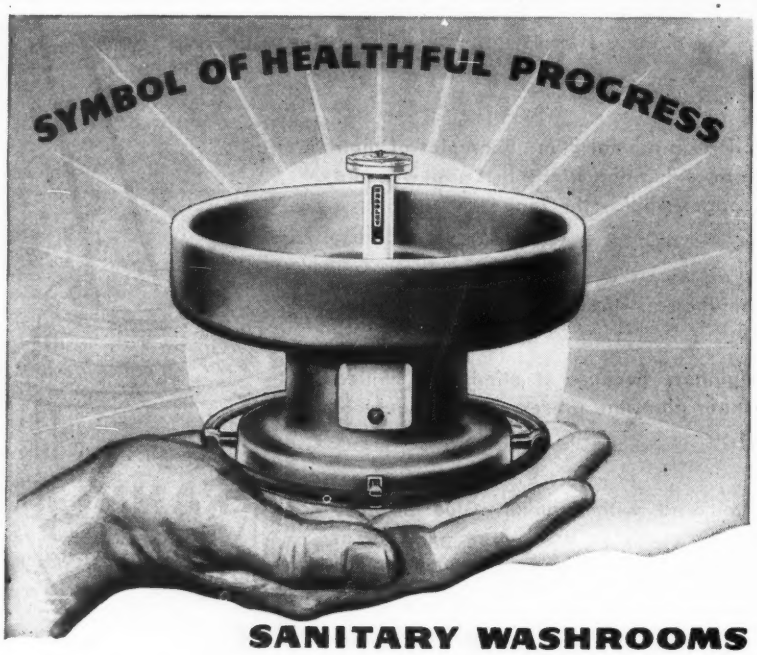
14. Vary your teaching methods from time to time. "Variety is the spice of life." Keep on the alert for interesting and appealing kinks and ways of doing things. Students like to be surprised occasionally.

These are only a few of the items that might be listed. Many others can certainly be mentioned. There may be some merit in a *Handbook for Junior-High-School Industrial-Arts Teachers*, developed cooperatively and distributed nationally to all teachers. It could contain a great many suggestions or even *principles* which would bring our thinking about methods of teaching much closer together. Would it not be well for the Industrial Arts Section of the AVA to consider such a publication?

Course Offerings and Sequences

There is a further need for us to consider which areas of industry shall be sampled in our junior-high-school industrial-arts courses and in which sequence they shall be taught. While we agree that certain basic industries are worthy of inclusion, we have strayed far afield in much of our thinking. To our somewhat standard offerings of woodwork, mechanical drawing, sheetmetal, machine shop, electricity, and printing, we have in many communities added a host of others. We speak now of crafts such as leatherwork, tin-can craft, paper cutting, textiles, ceramics, plastics, cement, art metal, lapidary work, and many others. Automobile mechanics is taught in some schools, forging still holds forth in others, while even welding and aeronautics are included in other communities. Have we become spread so thinly that we are losing sight of the original intent of our work, or has the original intent become obsolete?

In the June, 1945, issue of *Education* magazine is an article which makes mention of what our offerings should be. It is written by Mr. Roy Fales, Supervisor of Industrial Arts, New York State



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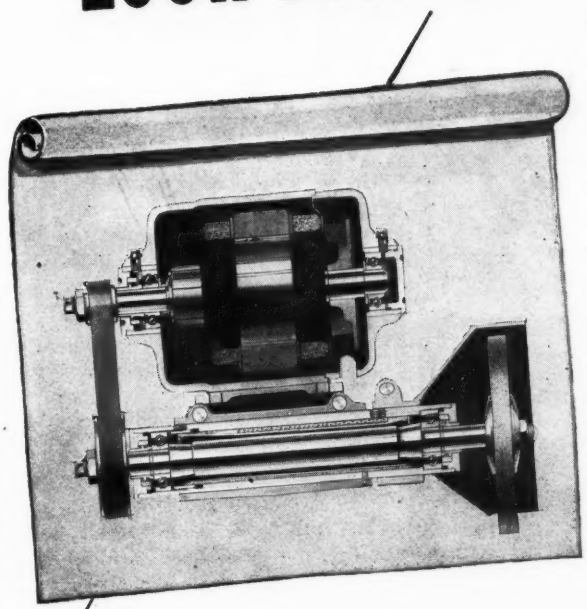

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Department of Education, under the title of, "Industrial Arts Modifies Behavior," and he has this to offer:

The junior high school is sometimes termed the exploratory period in which children are naturally very restless and highly active. Their span of attention is short and nature forces them to rush from one thing to another. Because of this, the schools should provide a maximum number of experiences. If exploration is to be accepted as a worthy objective and if it is to be attempted, industrial-arts teachers must study industry and portray it to their pupils in all of its breadth and fullness. A cafeteria type of course is most appropriate.

Mr. Fales then lists 12 major industries in the United States in descending order as to the number of workers or jobs in each. He continues thus:

Metal, textile, and printing industries offer youth more jobs than any of the other types of work because they employ more people. If industrial arts is to reflect industry, these three types of work will be found predominant in industrial-arts departments.

He then mentions the woodwork, transportation, and ceramic industries as a part of a true exploratory offering in industrial arts and states that:

When all of these types of industries are included in every industrial-arts department, pupils will receive good consumer education and also broad exploratory experience which will play a vital factor in guidance.

. . . They should be a part of every junior-high-school course regardless of whether one or more teachers are instructing the classes. . .

What shall be the factors that determine what we will include in our offerings? Industry, junior-high-school objectives, maturity of our pupils, abilities of teachers, available equipment, types of communities, or our own objectives for our own area of education? Are we running the risk of becoming "educationally anemic" because we are so *general*? Or does it make any difference as long as we have some sort of *activity*? These questions demand an answer from someone.

There was a time in our history when we were much more agreed on this issue than we are today. Perhaps the rapid growth and division of industry is confusing us. At any rate, the time has arrived for us either to condemn or approve what we are attempting to do, and to set up principles which will determine whether or not certain types of activities are worthy enough to be included in our program. Perhaps a workable and an acceptable set of objectives is all that we need.

Recommendations

While this discussion "accentuates the negative," and points out several weaknesses of junior-high-school industrial arts, we are all aware that it also has many points of strength. All is not as deplorable and chaotic as it may appear. We have a going program and a well established one. It is no longer numbered among the "fads and frills" as it once was. It serves a very worthwhile purpose at this level even though it may leave much to be desired. It is not that we wish to make a *bad* program *good*, but because we wish to make a *good* program *better* that these issues are raised. Our weaknesses are not due entirely to our own inefficiency or lack of interest. None of them is so bad that it cannot be remedied.

As a help toward the solution to many of our problems, it is recommended that the matter of state supervision of industrial arts be given much more consideration than ever before. We have waited long for the "postwar years." They are with us now. We cannot wait any longer. Each state in the union should have one or more persons charged specifically with industrial-arts supervision and direction. There should also be a "national supervisor" in the U. S. Office of Education charged with the coordination and direction of our program nationally. An organization of state supervisors headed by a "national supervisor" could accomplish much in the way of unifying our thinking, coordinating our efforts, setting up objectives, issuing syllabuses, and keeping us all generally "on the right track."

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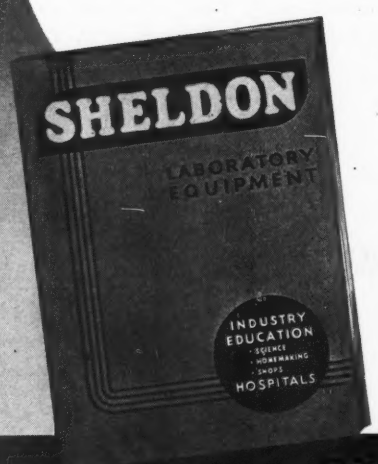

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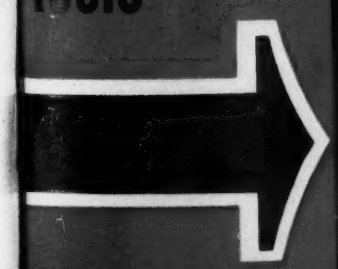

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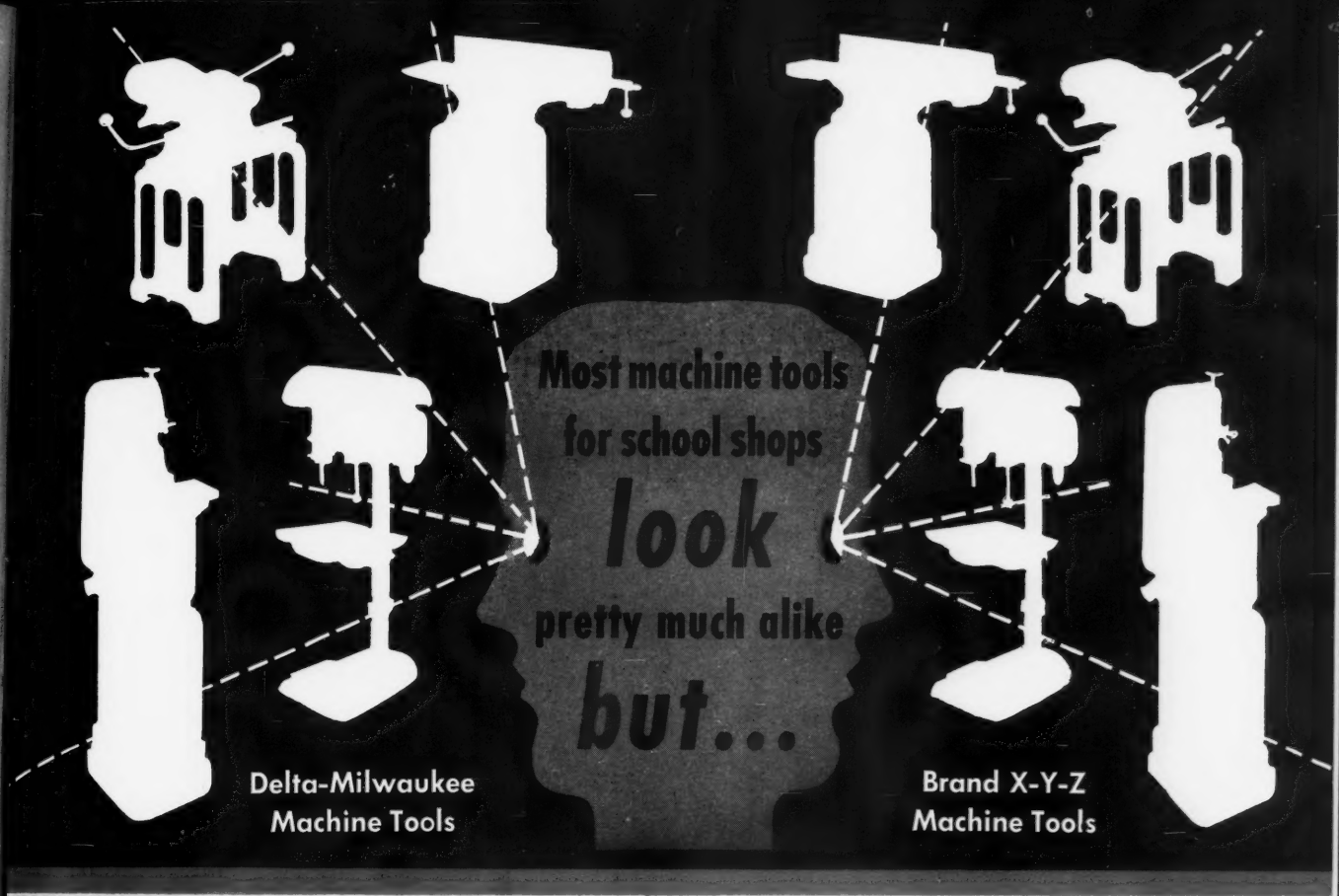

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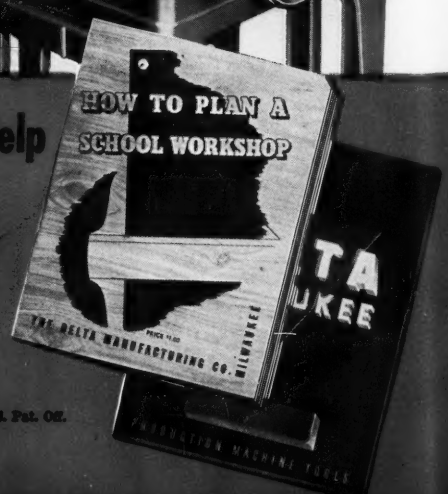

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ABOUT YOUR FELLOW TEACHERS

C. E. HIGHLEN has resigned as assistant to the executive secretary of the American Vocational Association, L. H. Dennis, to become principal of vocational schools, Atlantic City, N.J. . . . O. B. BADGER, director of vocational education and industrial arts, Portland, Ore., public schools, has resigned to join the staff of the Brooks-Wilson Advertising Agency, Tulsa, Okla. . . . E. L. SCHROEDER of the Victor Animatograph Corp. and well known to many teachers because of his knowledge of the visual-education field died recently at 48 years of age. . . . CARLTON DWIGHT, vocational instructor at Central High School, Binghamton, N.Y., has been named principal of the Vocational and Continuation School, Binghamton. . . . E. F. MITCHELL, JR., acting Mississippi state supervisor of trade and industrial education during W. D. GARDNER'S service in the Navy, has been elected state supervisor. Mr. Gardner has resigned to act as training officer in the field of trade and industrial education for the Veterans Administration. . . . WALTER M. NORTON has been appointed director of the education and training division, RCA-Victor Corp. which will extend its activities in the manufacture and sale of equipment for audio-visual education and personnel training. . . . WILLIS WAGNER of the faculty of Northeast Junior High School, Kansas City, Mo., has been named to the teaching staff of the industrial arts department, Iowa State Teachers College, Cedar Falls. . . . LESLIE J. NUTTING has been appointed assistant supervisor in the field of trade and industrial schools in the Massachusetts Department of Education. J. EDWARD SHARKEY and PORTER PERKINS have been named to work on the inservice training program for veterans. . . . WILLIAM CHAMBERS, principal of night-school and extension courses at Macomber High School, Toledo, Ohio, has been appointed coordinator of vocational education at Lima, Ohio. . . . CLIFFORD FROELICH, former North Dakota state supervisor of information and guidance, succeeds FRED FOWLER on the staff of the Occupational Information and Guidance Service, U. S. Office of Education, Washington, D.C.

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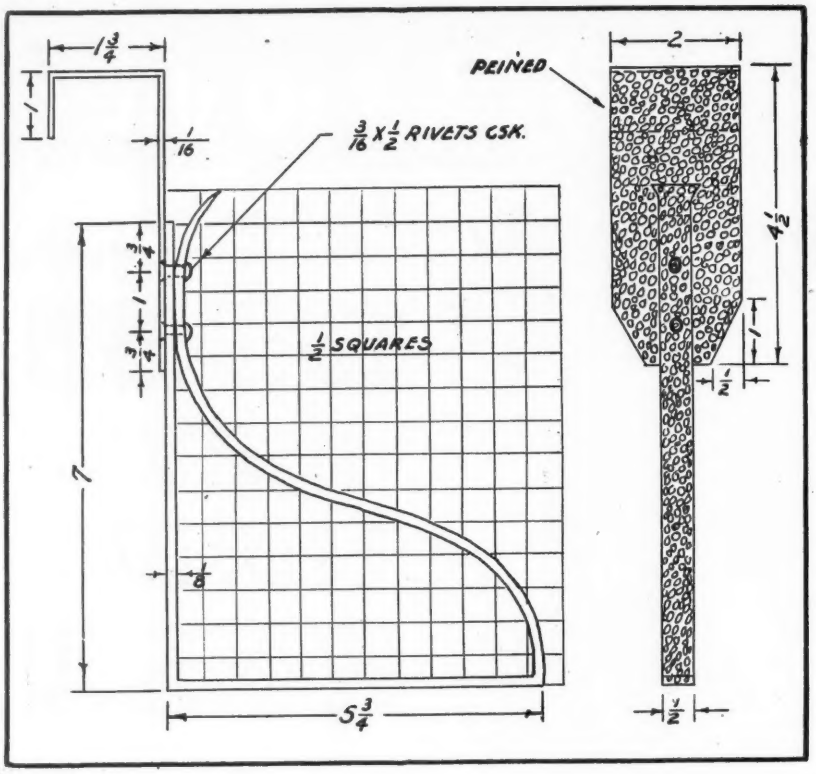
BY *E. P. Peterson*



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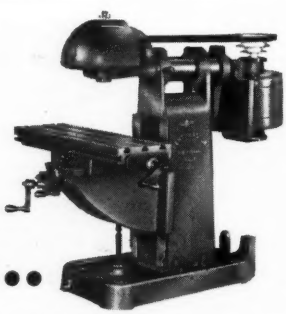

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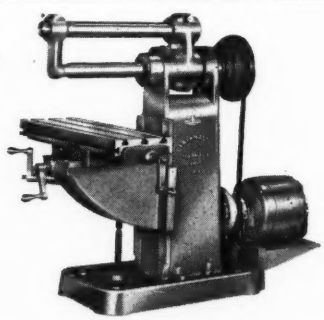

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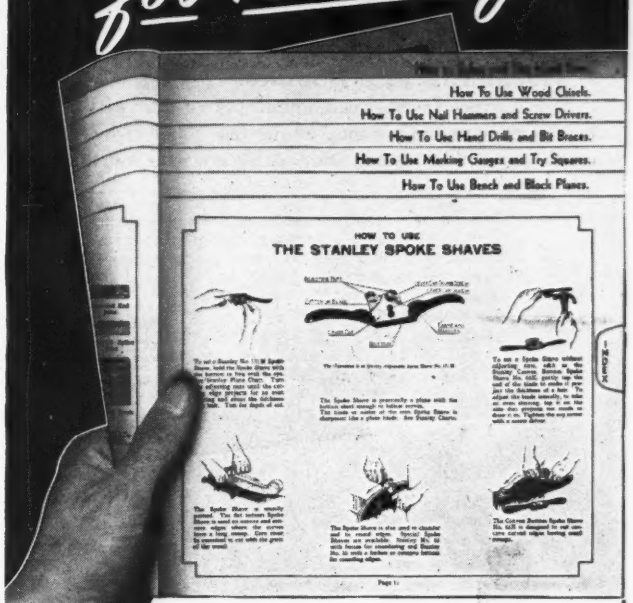
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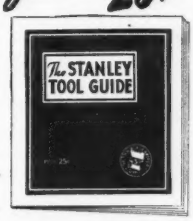

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6. File and sandpaper top of ribs.
7. Cut slot for wing spars and remove pins.
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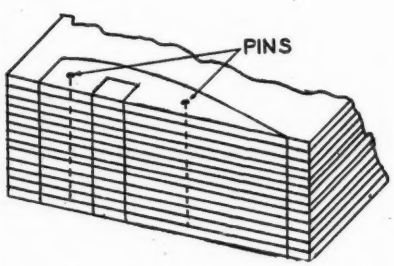
9. Pin together and then file and sandpaper them all at once to shape and cut slots for wing spars.



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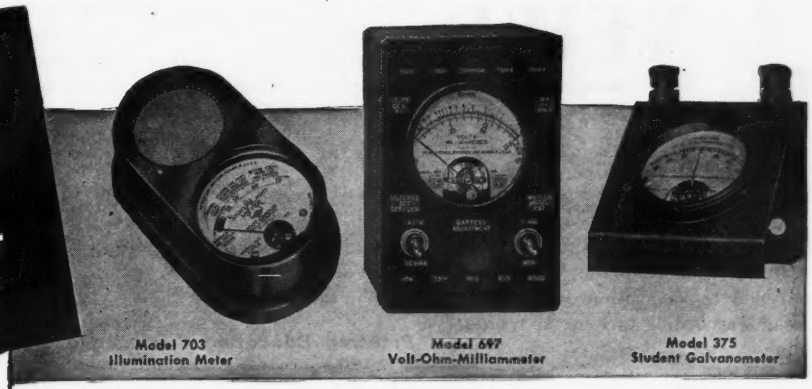

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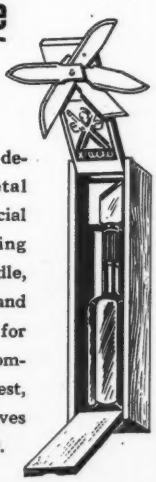

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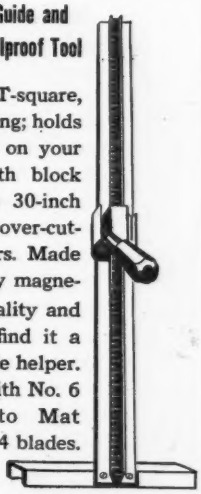

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NEWS

What's Doing in the Field of INDUSTRIAL EDUCATION

Epsilon Pi Tau

As part of its plan to resume professional activities now that the war is over, Epsilon Pi Tau will hold a program at the spring meeting of the American Industrial Arts Association on May 10 in Chicago, according to John A. Whitesel, Acting National Secretary. The fraternity will have an initiation at 4 P.M. and a banquet program at 6:30 P.M. on Friday, May 10, at the Oak Park Arms Hotel. The banquet and program will be open to nonmembers of the fraternity interested in the promotion of the profession. Dinner reservations should be made with the national office, temporarily located at Oxford, Ohio. Meetings of the American Industrial Arts Association will be held on May 11 at the Oak Park-River Forest High School. The fraternity plans to hold meetings in conjunction with other professional associations in the field.

Printing Education Conference

THE 21st Annual Conference on Printing Education, sponsored by the National Graphic Arts Education Association, will be held on June 13-15, at the Hotel Benjamin Franklin in Philadelphia. The theme of the conference will be "Graphic arts education in the first year of peace." Further information regarding reservations and programs can be secured from the National Graphic Arts Education Association, 719 Fifteenth St., NW, Washington 5, D.C.

Oswego Conference

THE first postwar annual spring conference for teachers of industrial arts and farm shopwork, guidance counselors, and supervisors will be held at the State Teachers College, Oswego, N.Y., on May 2 and 3. The conference theme, "Industrial Arts in the Next Decade," will be exemplified by prominent speakers, shop demonstrations and exhibits, and commercial exhibits. Frank C. Moore, Director of Industrial Arts, Cleveland, Ohio, will speak at the conference and at the annual banquet.

Pennsylvania Meets

THE Pennsylvania Vocational Education Association is convening at Eagles Mere on June 26-28, resuming an annual and pleasant custom that was temporarily halted by the war.

Oregon Summer Session

TWO summer sessions are being offered at Oregon State College, Corvallis, this summer. One will convene from June 18 to July 26 while the other will be held July 27 to August 30. Course offerings include flight training leading to a private pilot's license, drafting, freehand drawing and design, elementary and advanced woodwork, pattern making, wood turning, recreation handcraft, machine-shop practices, machine and tool maintenance, forging, gas and electric welding, ornamental iron work, foundry practice, sheetmetal, metal-craft, metal spinning, lapidary work, navigation, meteorology, and aerodynamics for teachers. Other courses include history of industrial education, visual aids, graphic aids, trade and occupational analysis, philosophy of vocational education, planning and organizing courses, guidance and counseling, and others. A special summer bulletin may be secured from the college.

40 Years

THE address, "Forty Years in Vocational Education," given by Dr. J. C. Wright at the Buffalo convention of the American Vocational Association has been reprinted by the Burgard Vocational High School Press of Buffalo and copies have been distributed by John W. Studebaker, U. S. Commissioner of Education, as a tribute to Dr. Wright on his retirement.

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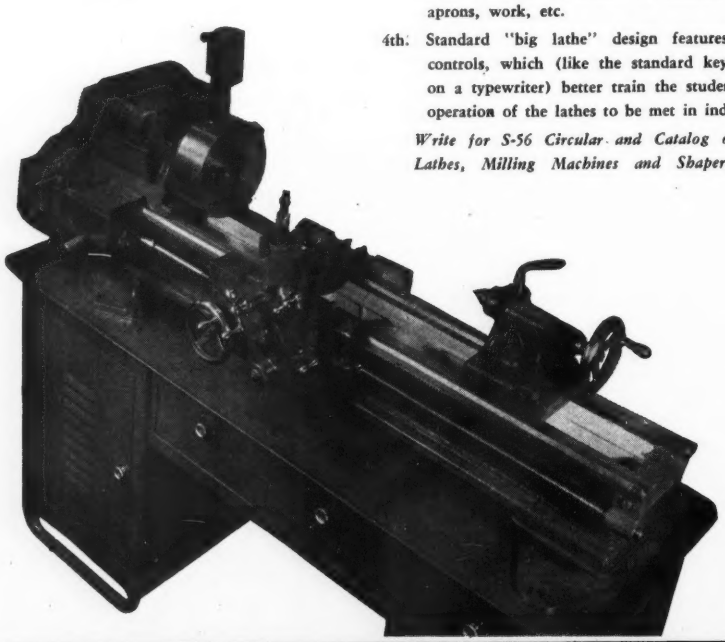

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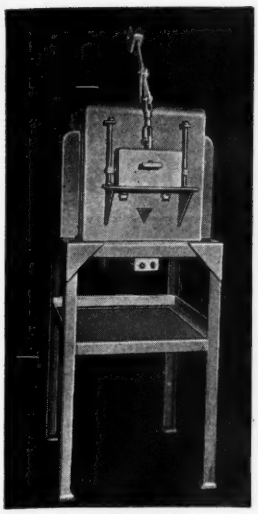

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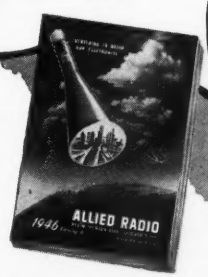

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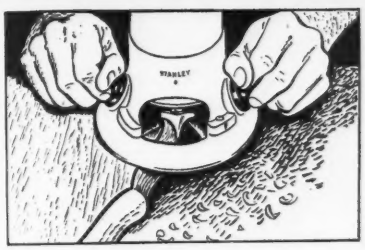

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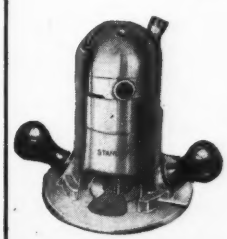

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BY *Frank Johansmeyer*
AND *Steve Varjan*

Manhattan High School of Aviation Trades, New York City

THIS tool board is one of five used in our classes. A crew chief checks it by looking for a tool check in place of each tool removed. Shop organization is aided by the conveniently located boards as (1) students obtain tools quickly, (2) toolroom rush is avoided, (3) small tools are constantly checked, and (4) tools are never lost.

The board was made from an old 16" x 21" drawing board by covering it with tempered masonite and blue felt cloth. A bright metal frame was added and patented metal tension clips were screwed in position for the tools. A handle on the top is used for carrying it to the toolroom at the close of the day. It hangs from a safe simple bracket made from sheetmetal.

The toolboard in use in the sheetmetal shop.

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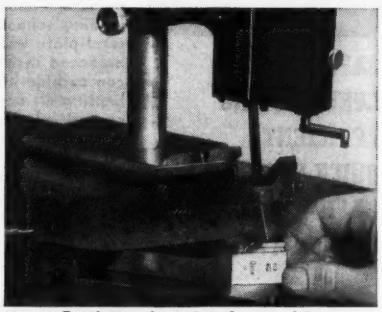
Setting a snap-gage to millionth-inch accuracy for a camshaft inspection.



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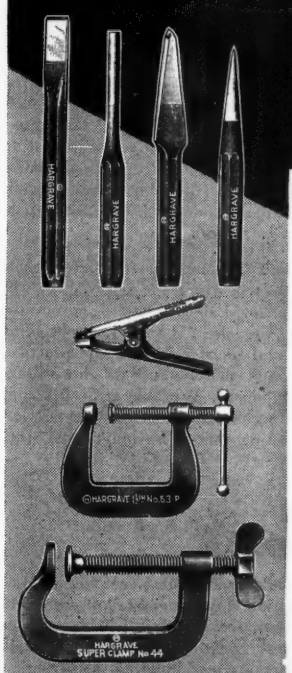

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Instructional RESOURCES

The Practice of Printing (Third Edition) Polk. Peoria, Ill.: The Manual Arts Press, 1945. Pp. xiv + 300. $2.25, single copy; five or more, $1.69 each.

A standard high-school printing text for many years, this new third edition of *The Practice of Printing* has been modernized with new illustrations and new samples of layouts and displays. All of the high quality of former editions has been maintained.

This textbook covers the whole practice of printing for school conditions, with special emphasis placed on composition and typographic effects.

Ralph W. Polk is supervisor of printing instruction, Detroit, Mich., Public Schools.

Mathematics for Technical and Vocational Schools (Third Edition). Slade, Margolis. New York: John Wiley & Sons, Inc., 1946. Pp. vii + 532. $2.50.

The latest edition of a thorough, comprehensive textbook in trade mathematics for day and evening technical schools, covering arithmetic, algebra, geometry, and trigonometry. Theoretical discussion and derivation of formulas have been eliminated or reduced to their simplest form. The large number of illustrative examples and problems will be found of great value for selfinstruction as well as for classroom work. The tables included have been selected with an eye to assisting the student in solving the problems contained in the book.

This new revision improves the original text generally, and brings those portions which deal with machine-shop problems into conformity with modern standard practice.

Samuel Slade teaches at the Machine and Metal Trades High School, New York City; Louis Margolis is the head of the mathematics department, Alexander Hamilton Vocational High School, Brooklyn, N.Y.

General Leathercraft (Revised Edition). Cherry. Bloomington, Ill.: McKnight & McKnight, 1946. Pp. 112. $1.20.

New projects have been added to this revised edition of a widely used school text on leathercraft, making 35 projects in all. An accurate drawing for each object to be made is given, along with definite step-by-step instruction for completing it. This instruction is greatly simplified by the use of many close-up photographs showing how the more difficult operations are performed. The book also contains information on materials and tools with a list of dependable firms where such supplies can be purchased. A brief history of leather and its development as a commercial product, along with information on how it is obtained and prepared, adds to the value of the book.

Raymond Cherry is a member of the industrial-arts department, Lockport Township High School, Lockport, Ill.

Simplified Architectural Drawing. Buss. Chicago: American Technical Society, 1946. Pp. 258. $4.75.

This book is written to fill a gap existing between instruction pertaining to mechanical drawing and that pertaining to architectural design. It contains the explanations of the professional man to the student respecting the full scope of the work. A rudimentary course in general mechanical drawing supplies a desirable background for understanding of the material presented in this book. The text will be found useful in teaching architectural work to all secondary-school students, from those who devote only a short period to the study to the vocational student who intends to make architecture a life work. Contains numerous examples and graded problems; excellently illustrated.

Truman C. Buss, Jr., has had many years of both architectural and teaching experience. He is the head of the architectural drawing department, Pullman Free School of Manual Training, Chicago, Ill.

Elements of Practical Radio Mechanics (Revised Edition). Marshall, assisted by Greenleaf. New York: Current Books, Inc., 1945. Pp. xi + 231. $2.50.

The purpose of this book is to present to the individual the essential manipulative skills and related theoretical information pertaining to construction, adjustment, repairs, and measurements of radio receivers and transmitters.

The general plan of the book is a series of jobs so arranged as to enable a beginner to master essential operations of radio mechanics if he completes each job carefully and according to instructions contained therein. Each new teaching unit is explained by means of an instruction sheet. A number of items have been excluded due to the limitations of the student's available time; some devices and practices have been excluded due to their having become outmoded. The use of a good theoretical text on radio to augment the material included in this text is recommended by the author. All of the content has been prepared on an apperceptive basis. No new term, operation, or procedure is presented unless it is thoroughly explained, first, from what has already been learned and, second, from the point of view of the average layman.

Samuel L. Marshall is instructor of radio, Brooklyn High School for Specialty Trades, Brooklyn, N.Y.; he was assisted in the preparation of this text by Peter Greenleaf, chairman of the science department, Eron Preparatory School, Brooklyn, N.Y.

Simplified Punch and Diemaking. Walker, Taylor. New York: The Macmillan Co., 1946. Pp. ix + 235. $5.00.

Each step in the design, construction, and operation of dies and punches is fully explained in this book. Inclusive, up-to-date (much valuable information on new materials and methods), and entirely practical, it provides a comprehensive reference for tool engineers and others engaged in punch and die work, as well as a complete text for those learning punch and diemaking. All of the important types of dies and punches used today are covered, with detailed information on the specifications, materials, methods of construction, and uses of each.

Well illustrated with photographs, drawings, and diagrams. At the end of the book there is a glossary of shop terms, containing much useful allied information, and all tables and charts needed by die makers.

James Walker is tool and die engineer for the Southern Aircraft Corp. and the G. and J. Manufacturing Co. Carl C. Taylor is supervisor of tool construction, Southern Aircraft Corp.

Fluids, a continuation of the Air Age Physics series and containing 1042 pictures in the form of 13 discussional-type slidefilms, is now available from the Jam Handy Organization. Each film unit is divided into lessons; each lesson is followed by review and quiz questions. The following subjects are covered: liquid pressure; transmitting pressure through liquids; buoyancy and Archimedes' principle; density and specific gravity; specific gravity of solids and liquids; atmospheric pressure; exploring the atmosphere; barometers and weather; gas pressure; measuring fluid pressure; Bernoulli's principle; reciprocating pumps; jet pumps; siphons; rotating pumps. For full details write the Jam Handy Organization, 2821 E. Grand Blvd., Detroit, Mich. *Please mention* SCHOOL SHOP.

Charts I, J, and K of the industrial safety chart series have recently been released by the Department of Labor. Chart I covers the safe use of wrenches; Chart J, arc-welding equipment; and Chart K covers safe practices in the use and maintenance of low-voltage electrical equipment. Available at 5c per copy from the Superintendent of Documents, Government Printing Office, Washington 25, D.C.

New technical book catalog, containing date of publication, price, number of pages, detailed descriptions, and full table of contents of latest books on technology, metals, technical dictionaries, building construction, and other subjects has recently been issued by The Chemical Publishing Co., 26 Court St., Brooklyn 2, N. Y. *Copies free upon request. Please mention* SCHOOL SHOP.

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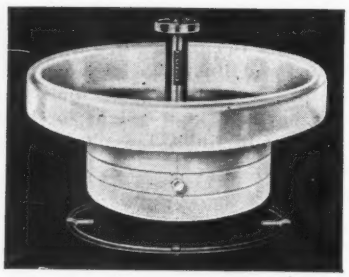

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Mid-States Equipment Corp. has recently announced a new, small portable electric

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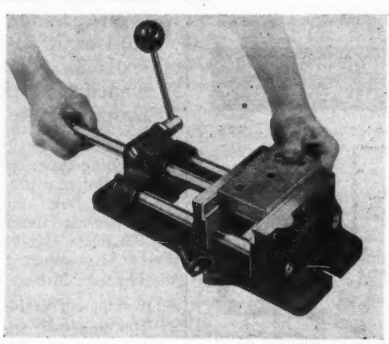
Coated Abrasives in Plastics

Behr-Manning's newest educational release, "Coated Abrasives in the Plastics Industry," is a supplement to the Behr-Manning Lecture Course on Coated Abrasives. It is in three parts: first, an introduction to the plastics with a simplification of their names and common family groups; second, methods, equipment, and abrasives for sanding the plastics; third, a 17" x 22" plastics reference chart presenting all of the recommendations contained in the text in wall-chart form for classroom posting. For a free copy, write Behr-Manning Corporation, Educational Service Department, Troy, New York; *or check no. 67 on the coupon.*

New Screwless Vise



A revolutionary development in vise manufacture has recently been announced by the National Machine Tool Co. Instead of the adjusting screw common in most vises, the Heinrich "Grip-Master" has a movable jaw which can be adjusted to the work in a jiffy, and then locked securely by an easy press on a locking lever. The bars and locking mechanism are hardened and precision ground.

An interesting brochure describing the four models of the new screwless vise, containing specifications and prices, may be had from National Machine Tool Co., Racine, Wisconsin; *or by checking no. 68 on the coupon.*

New Model Home Kit

The Joe Ott Mfg. Co. has announced a new model-building project—the "Modelrite" home construction kit.

This kit consists of material and plans for building a realistic miniature home constructed in the same manner as a regular house. Present models are for practical use for planning an attractive five- or six-room house for actual home building.

For full details concerning the new models and their availability, write Joe Ott Mfg. Co., 111 W. Jackson Blvd. Chicago, Ill., *or check no. 69 on the coupon.*

New Model Radio Kit

The Radio Kits Co. announces a post-war model radio kit S-5, designed for use in schools and for occupational therapy work. Each kit contains complete building instructions, wiring and pictorial diagrams, and voltage and current charts. The instructions furnished with the kit represent an innovation in kit construction. The information is illustrated in a series of progressive stages, showing the wiring.

Kits are also available for more advanced student work. Complete catalogs will be furnished on request to the Radio Kits Co., Dept. S., 120 Cedar St., New York 6, N. Y.; *or by checking no. 70 on the coupon.*

New Literature

Catalog 25, just released, shows in full color many of the outstanding South Bend Lathes. Complete descriptions and specifications of each lathe shown are included. For a free copy, write South Bend Lathe Works, 420 E. Madison St., South Bend 22, Ind.; *or check no. 71 on the coupon.*

Slick New Tricks for Building Better Model Planes, a colorful 20-page primer published in connection with the entry of Plastic Wood into the model building field. Describes the findings of the experts who last year successfully tested Plastic Wood in model building. Sufficient copies for yourself and interested students may be had by request on school stationery from Boyle-Midway, Inc., 22 East 40th St., New York 16, N. Y., *or by checking no. 72 on the coupon. State number of copies desired.*

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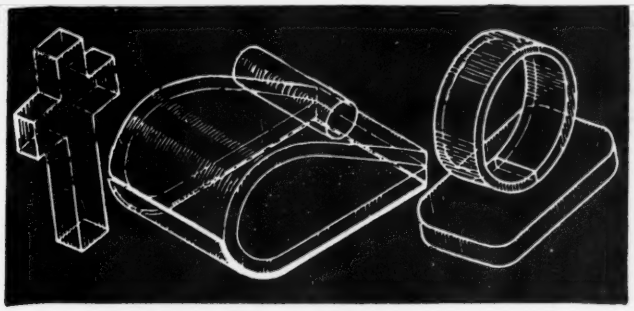

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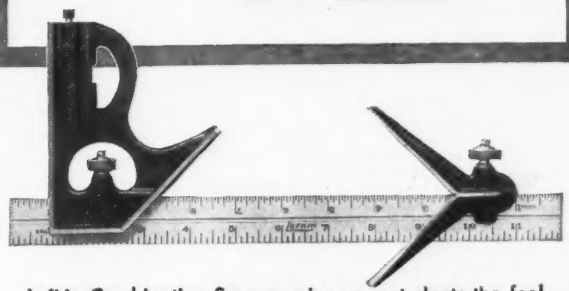

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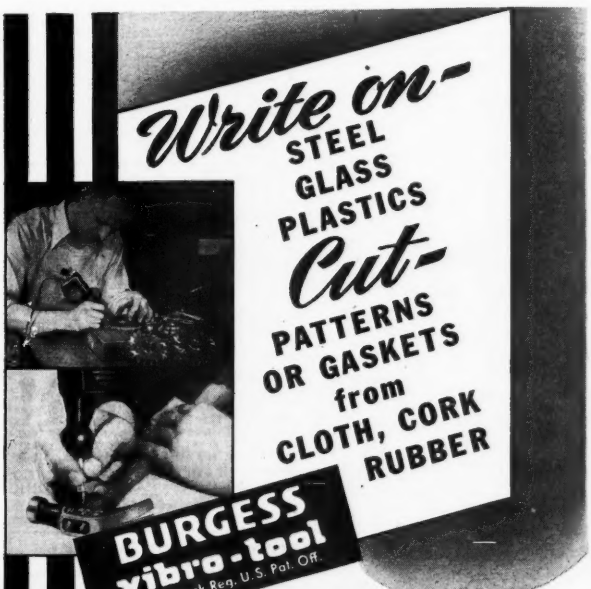

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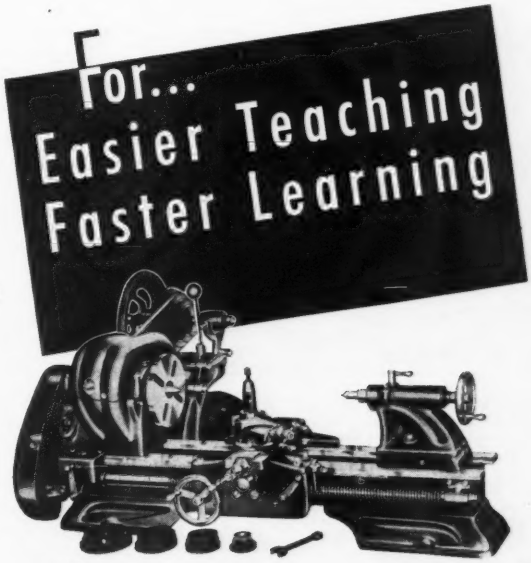

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IN THE Morning Mail . .

[Brief comments about SCHOOL SHOP and the field it serves are invited. Address the Editor, SCHOOL SHOP, Ann Arbor, Michigan.

Gentlemen:

Would it not be a good idea to print shop notes or good projects on one page only so that either the whole page could be removed from the magazine and filed or at least it could be clipped and pasted in a scrap book for easy reference? Now material on the back of the page is lost if the pasting method is used. What do you think?

G. A. BECKER,
Lakewood, Ohio

EDITOR'S NOTE: With paper as precious a product as it is, the printing of projects on one side of the sheet is impractical. Readers wishing to paste material from SCHOOL SHOP may readily secure additional copies of the issue in which they are interested by writing the Circulation Department, SCHOOL SHOP, Ann Arbor, Michigan, and enclosing 25 cents for each copy desired.

Gentlemen:

I have almost complete files of SCHOOL SHOP, bound in ring binders. In the general shop courses which I teach at Purdue University, SCHOOL SHOP has been a gold mine of good job suggestions. The advertisements have often been helpful in locating tools and materials. The feature articles and new items are greatly appreciated. In fact, we read and reread the entire copy, then keep it for future reference.

R. A. PLOWMAN,
Purdue University,
West Lafayette, Ind.

Gem Cutting . . . from page 9

a hole through the stone. If a number of holes are to be drilled, many craftsmen build an outfit where the tube is automatically raised and lowered.

Sooner or later one will wish to polish a specimen. This can be done on the flat lap by using successively finer grits, such as Nos. 100, 220, 320, and 500, and then polishing on the felt buff. Because it is easier to polish a slightly rounded surface than a flat surface, many prefer to grind the surface with a slight curve, sand on a drum-type sander, and then polish in the usual manner.

Books containing information on gem cutting and gem materials are:

William T. Baxter, *Jewelry, Gem Cutting and Metalcraft.* New York: McGraw-Hill Book Co., Inc. $2.75.

Kraus and Slauson, *Gems and Gem Material.* New York: McGraw-Hill Book Co., Inc. $3.50.

George Letworth English, *Getting Acquainted with Minerals.* New York: McGraw-Hill Book Co., Inc. $2.50.

Dake, Fleenor, and Wilson, *Quartz Family Minerals.* New York: McGraw-Hill Book Co., Inc. $2.50.

J. H. Howard, *Handbook for the Amateur Lapidary.* Greenville, S. C.: the author. $2.00.

The Art of Gem Cutting. Portland, Ore.: The Mineralogist Publishing Co. $1.50.

Magazines:

Rocks and Minerals, Peekskill, N. Y. Monthly. 25 cents a copy. $2 a year.

The Desert Magazine, El Centro, Calif. Monthly. 25 cents a copy. $2.50 a year.

The Mineralogist, Portland, Ore. Monthly. 20 cents a copy. $2 a year.

From Washington from page 34

"Furthermore, when it receives federal aid it must so adjust its internal distribution of all its funds so that every school district in the state shall have at least $40 a child per annum to spend on education."

This is at least a new wrinkle in formulas for federal aid to schools and Mr. Taft's adherence to the ranks of supporters of the federal-aid cause is helpful to those who believe in it. Both Mr. Taft and his new formula may in the long run have good effect on whatever vocational education bill comes up for debate—although at this moment the probabilities for such a debate at this session of Congress are not too bright.

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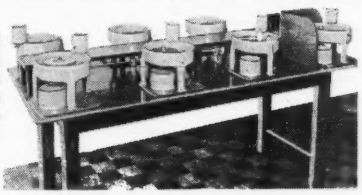

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FROM WASHINGTON

BY MICHAEL PACA

EDUCATION, like nature, abhors a vacuum. If a local community does not meet an educational need, the state will do it. And if the state fails, the federal government steps in to do the work.

This basic tenet was illustrated twice this month: First, when the Veterans Administration instructed its agents to supervise directly on-the-job training, despite the fact that such supervision was assigned to state departments of education.

Second, when John W. Snyder, Reconversion Director, called together officials of seven U. S. agencies to consider how to assure the education and training of veterans who presumably are not being adequately served.

A special word should be said about on-the-job training because it is becoming highly popular with veterans. Less formalized than classroom and shop training and shorter than apprenticeship, on-the-job training has already attracted more than 56,714 veterans, as against 39,925 a month ago. Charges are heard that this form of training has caught the state departments of education unprepared. Many of the states themselves report to Washington that they have neither funds nor staff to supervise and guide these programs. This has given unscrupulous employers an opportunity to swindle both veteran and government. While pretending to train the veteran, many employers utilize veterans as low-paid employees, without intention of providing either skills or opportunity for advancement. That is why the Veterans Administration is now calling for "black-and-white" training plans from the employer and is checking monthly on the veteran to see if he is making satisfactory progress. If not, the government subsistence allowance is cut off.

» Director Snyder's action is an indication that all the efforts of schools to take care of veterans flocking to them fall short of the need. List of suggestions to meet the critical situation, such as issued by the Federal Security Agency, are also not enough.

Men around Director Snyder believe that educators cannot, through their own efforts, solve the problem. That is why federal agencies, unrelated to education, will soon begin issuing directives and launch plans in an effort to provide schools with more housing for students, more teachers, and more equipment.

While the fine point implications of these two bold U. S. actions are being debated, no one debates the need for vigorous measures to assure that both better on-the-job training and more schooling facilities for veterans are needed.

In both actions, U. S. officials insist that they have no desire to interfere with local and state responsibilities. They do want to make certain that the needs of men, who have served their country in war, are served in peacetime.

» The men and women from 25 educational groups, who met in Washington to discuss the ills and woes of surplus property disposal this month, said some strong words about surplus property and its availability to education. For, despite one "streamlined" procedure after another announced by agencies responsible for surplus property, the flow of goods to schools and colleges dwindles. Prices are too high and the purchasing time allowed schoolmen is too short. The complex machinery built up by the Federal Security Agency in the states and in Washington to serve schools on surplus disposal is creaking. Schools can buy equipment cheaper from commercial re-sellers of surplus than they can from the War Assets Administration. These and other complaints were among those heard at the meeting.

Vocational education officials took a leading part at the conference in mapping out a campaign designed to impress upon President Truman, Congress, and the WAA that schools need surplus material, that they have been unable to get it under existing regulations and that immediate action to assure schools their rightful due is needed. Emphasis on "immediate action" is important. WAA officials plan to dispose of the bulk of their surpluses within 12 months.

» During the past decade, no one has opposed federal aid to education more vigorously than Senator Taft of Ohio. He himself has admitted that on the floor of the Senate. When, therefore, he introduced a bill seeking to spend federal dollars for the education of children in elementary and secondary schools, there was much buzzing in Washington circles on its implications. Was his action induced by "politics"? Was it a sincere conviction that a minimum schooling is after all the concern of the government? Most observers accept the second explanation.

Mr. Taft himself says that his bill is based on two principles "which have not been heretofore adopted. The first is that no state receives any aid, at least not after four years, unless it expends from its own funds 2.2 percent of the individual income payments to the state, which is more than the average spent throughout the United States on education. If it does not spend that much, it will receive no aid."

(Continued on page 32)

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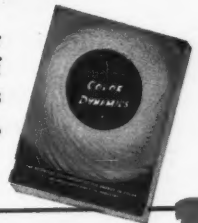
By the use of focal and eye-rest colors, operating parts of the machine are separated from stationary parts and the materials being fabricated. The worker is able to see his job better. Eye fatigue, so often the cause of lowered efficiency, is lessened. Morale-building colors improve the worker's mental attitude toward his job. Safety colors warn him of danger areas and reduce accident hazards.

• • •

● If you want your students to be equipped thoroughly for their future tasks, begin teaching COLOR DYNAMICS as part of your regular school course. You can demonstrate its benefits in your own manual training classes by painting machines, walls, floors and ceilings of your classrooms.



Write today for a free copy of our book, "*Color Dynamics*". Packed with useful information and practical suggestions, it makes a fine textbook. Address Pittsburgh Plate Glass Company, Paint Division, Dept. SS-5, Pittsburgh 22, Pennsylvania.

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